



Madden-Julian Oscillation: Recent Evolution, Current Status and Predictions

**Update prepared by
Climate Prediction Center / NCEP
July 23, 2007**



Outline

- **Overview**
- **Recent Evolution and Current Conditions**
- **Madden-Julian Oscillation Forecast**
- **Summary**



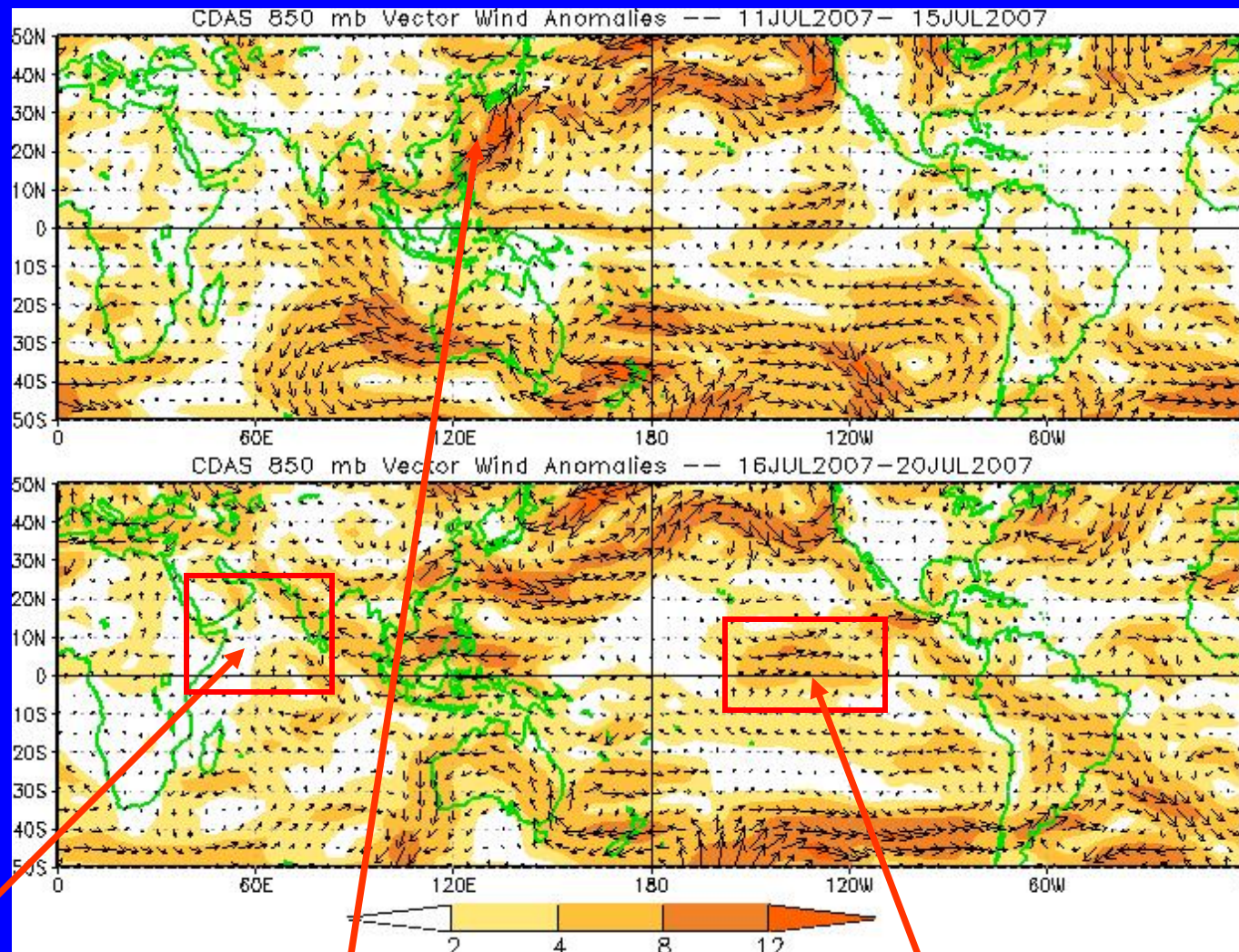
Overview

- **The latest observations indicate a strengthening MJO with the enhanced phase entering the Indian Ocean.**
- **During the past week, tropical convection has been focused across the central Indian Ocean while very dry conditions stretched from the South China Sea into the western Pacific Ocean.**
- **Based on the latest monitoring and forecast tools, moderate MJO activity is expected to continue during the next 1-2 weeks.**
- **Wet conditions are expected across the Indian Ocean and sections of southern Asia during the upcoming week with dry conditions continuing across the western Pacific.**



850-hPa Vector Wind Anomalies (m s^{-1})

Note that shading denotes the magnitude of the anomalous wind vectors



The Somali Jet has remained weak.

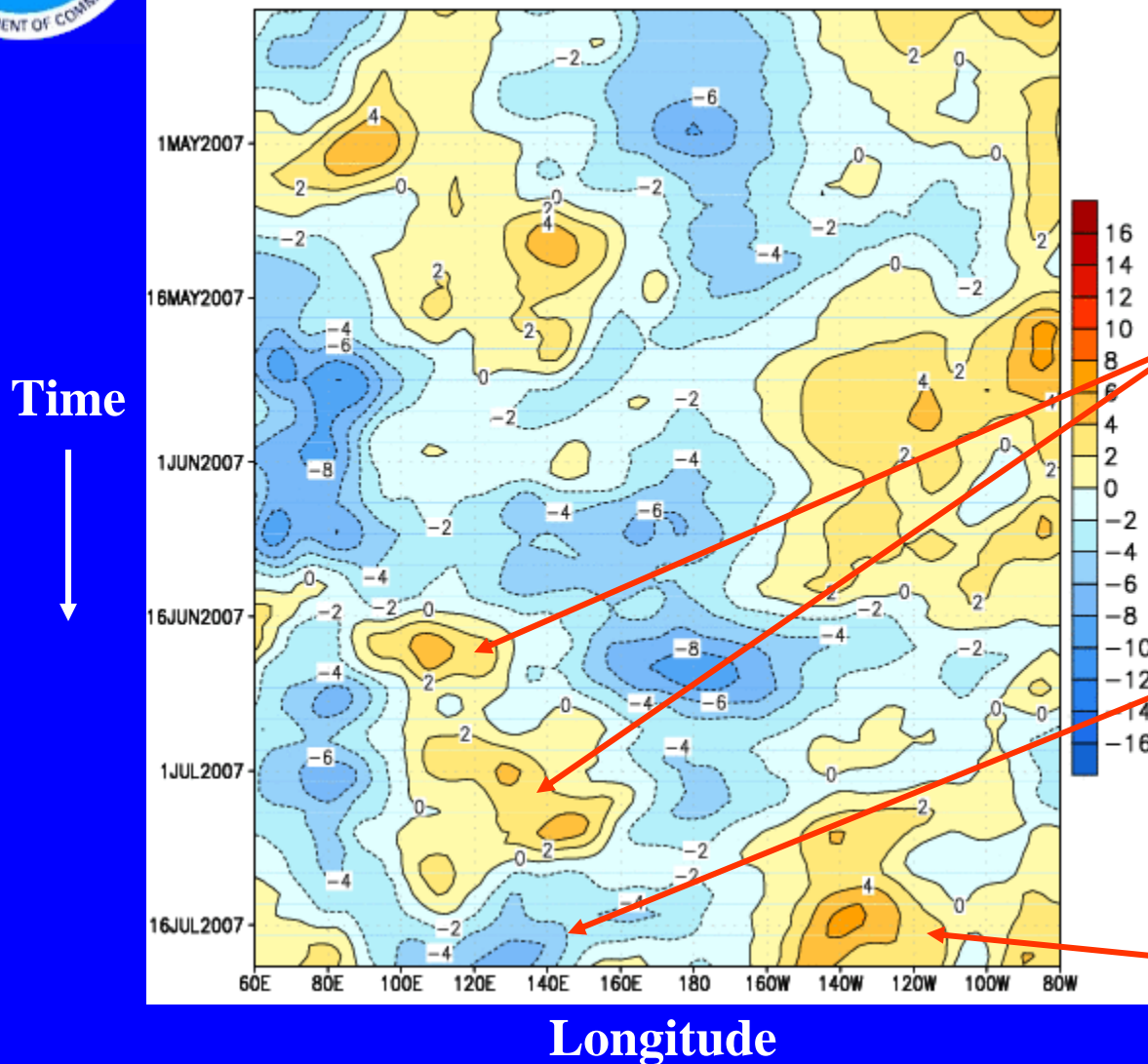
Low-level cyclonic circulation associated with Typhoon Man-Yi is evident in the west Pacific.

Westerly anomalies have strengthened across the east-central Pacific Ocean.



850-hPa Zonal Wind Anomalies (m s^{-1})

CDAS 850-hPa U Anoms. (5N-5S)



Westerly anomalies (orange/red shading) represent anomalous west-to-east flow.

Easterly anomalies (blue shading) represent anomalous east-to-west flow.

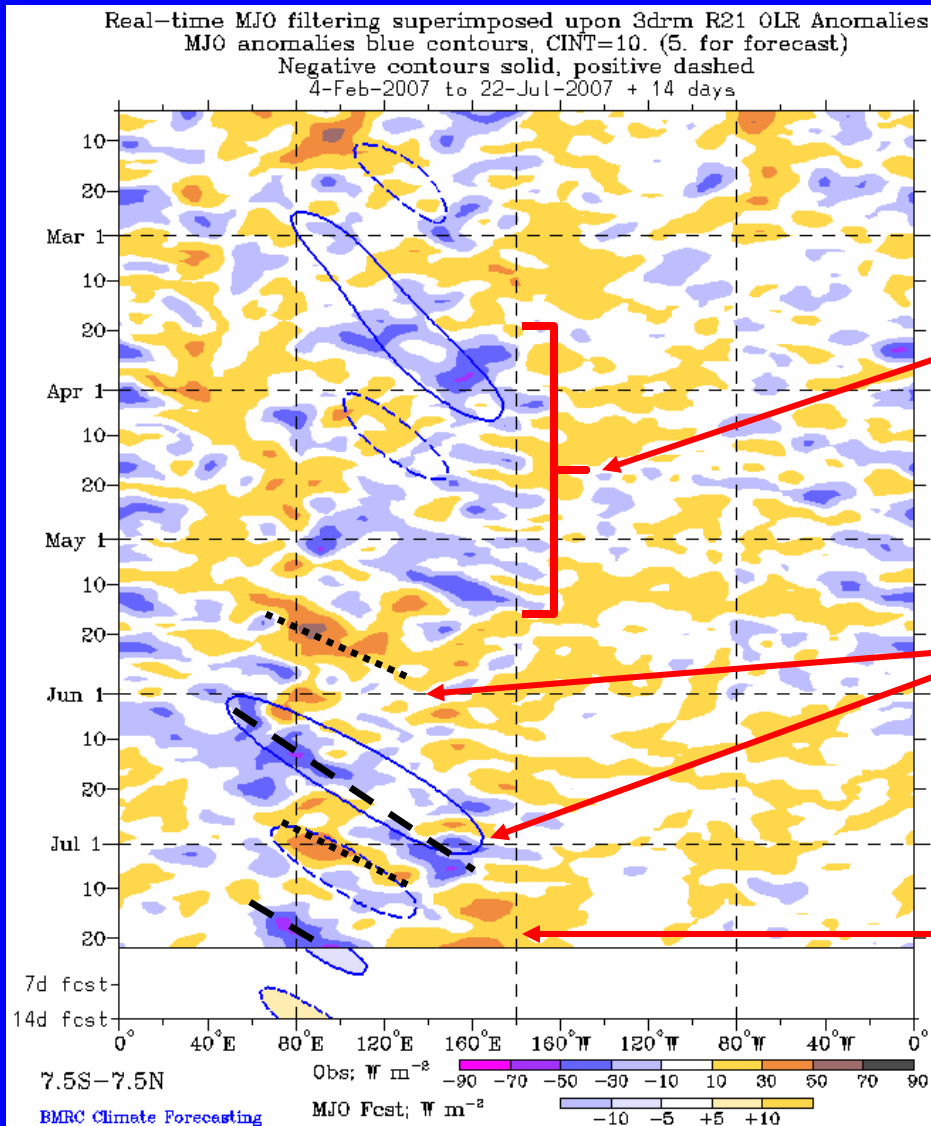
Westerly anomalies were evident across sections of the maritime continent and the western Pacific Ocean from the latter half of June into mid-July.

Easterly anomalies have strengthened across the Maritime continent.

Westerly anomalies continue across much of the eastern Pacific Ocean.



Outgoing Longwave Radiation (OLR) Anomalies (7.5°S-7.5°N)



Drier-than-normal conditions, positive OLR anomalies (yellow/orange shading)

Wetter-than-normal conditions, negative OLR anomalies (blue shading)

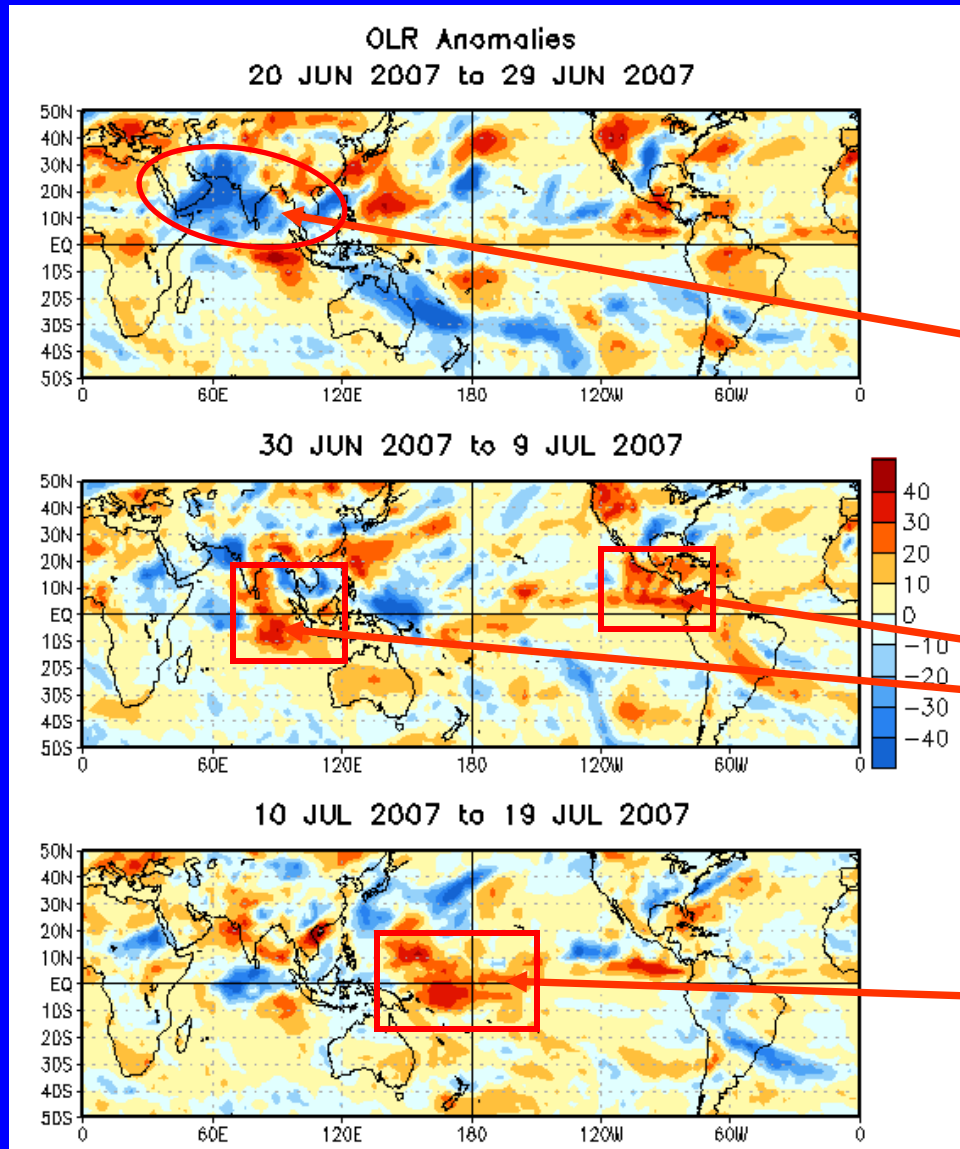
Intermittent periods of enhanced convection were evident in the western Pacific Ocean from late March into May.

Beginning in mid May, weak-moderate MJO activity has been observed as first suppressed convection and later enhanced convection shifted eastward from the Indian Ocean into the far western Pacific.

Enhanced convection has shifted slightly east across the Indian Ocean while suppressed convection is noted in the west and central Pacific.



OLR Anomalies: Last 30 days



Drier-than-normal conditions, positive OLR anomalies (red shading)

Wetter-than-normal conditions, negative OLR anomalies (blue shading)

During late June, enhanced rainfall continued over the Arabian Sea and expanded eastward to the Bay of Bengal. Dry conditions prevailed across the west Pacific.

Dry conditions developed across the equatorial Indian Ocean and continued across the east Pacific.

Dry conditions developed across the central Pacific during early-mid July.

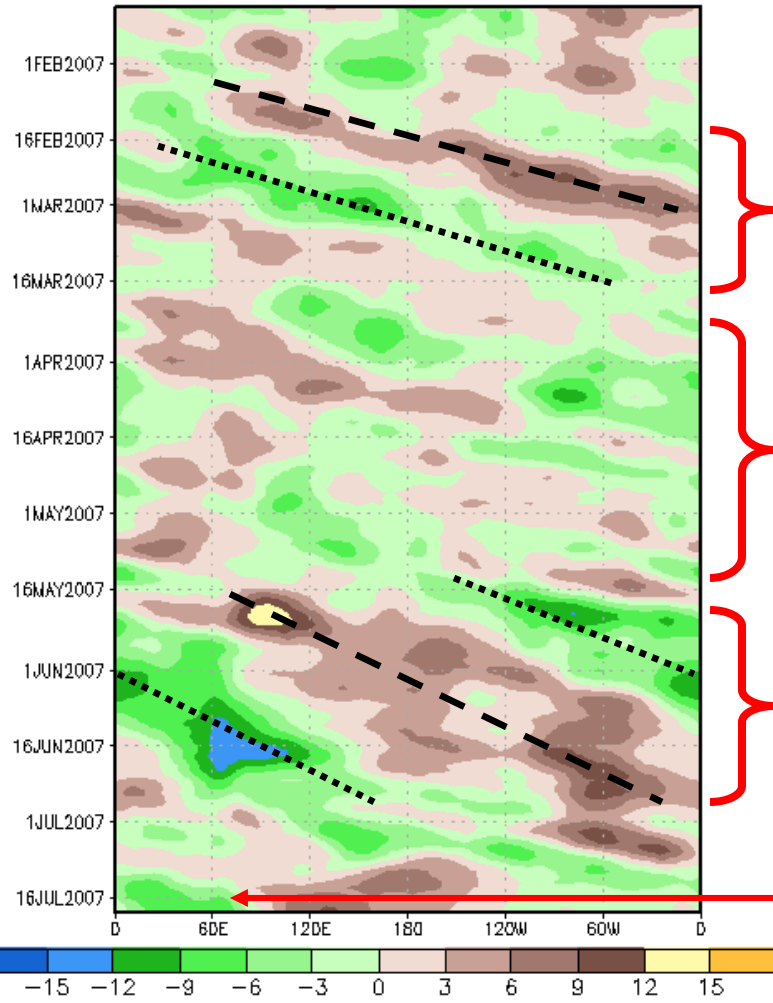


200-hPa Velocity Potential Anomalies (5°S-5°N)

Positive anomalies (brown shading) indicate unfavorable conditions for precipitation.

Negative anomalies (green shading) indicate favorable conditions for precipitation.

200-hPa Velocity Potential Anomaly: 5N-5S
5-day Running Mean



Time



Weak to moderate MJO activity was observed during late February and early March as velocity potential anomalies shifted eastward.

The MJO was weak or incoherent from mid-March to mid-May.

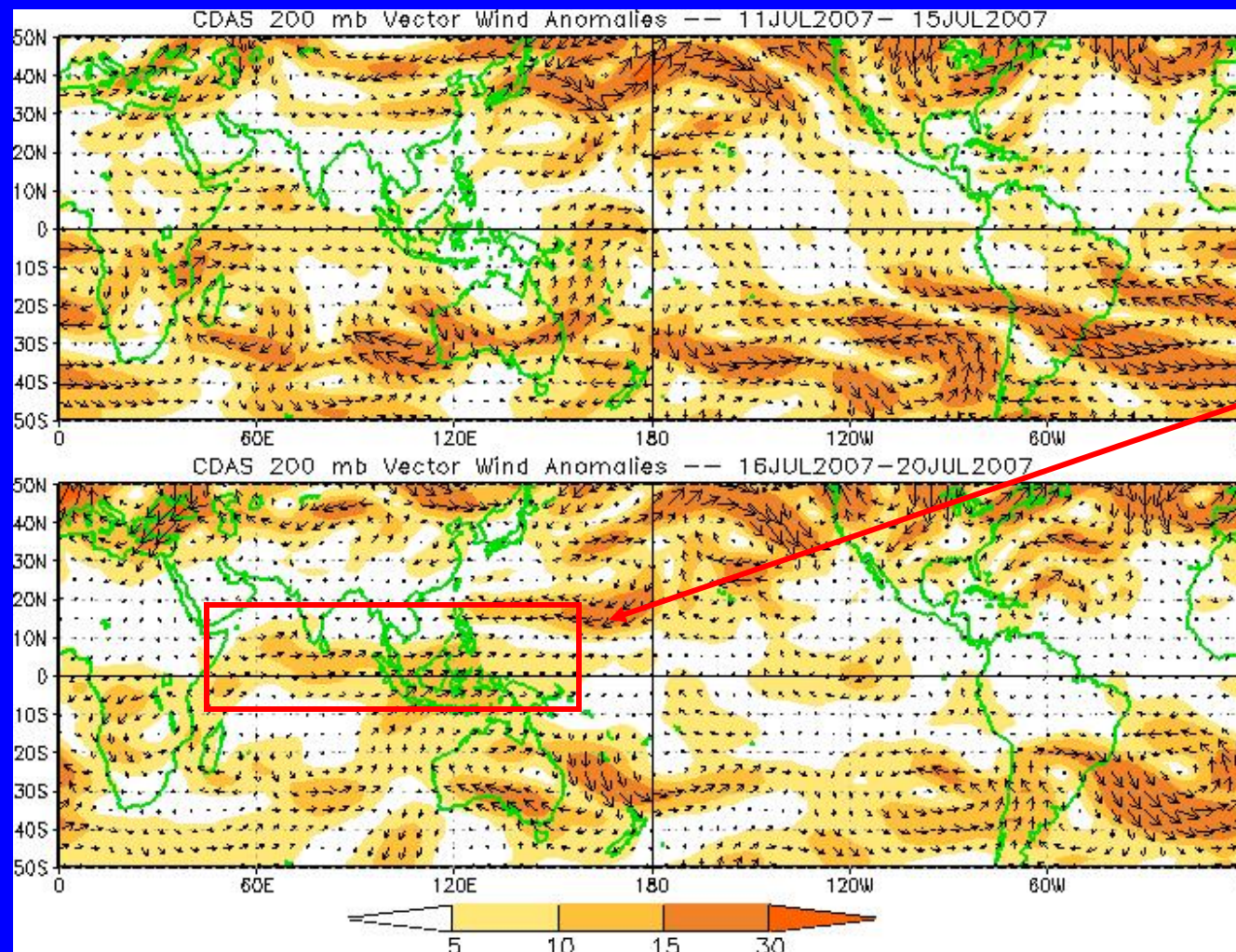
Weak to moderate MJO activity was evident from mid-May to early July.

The MJO has strengthened during the past week.

Longitude



200-hPa Vector Wind Anomalies ($m s^{-1}$)



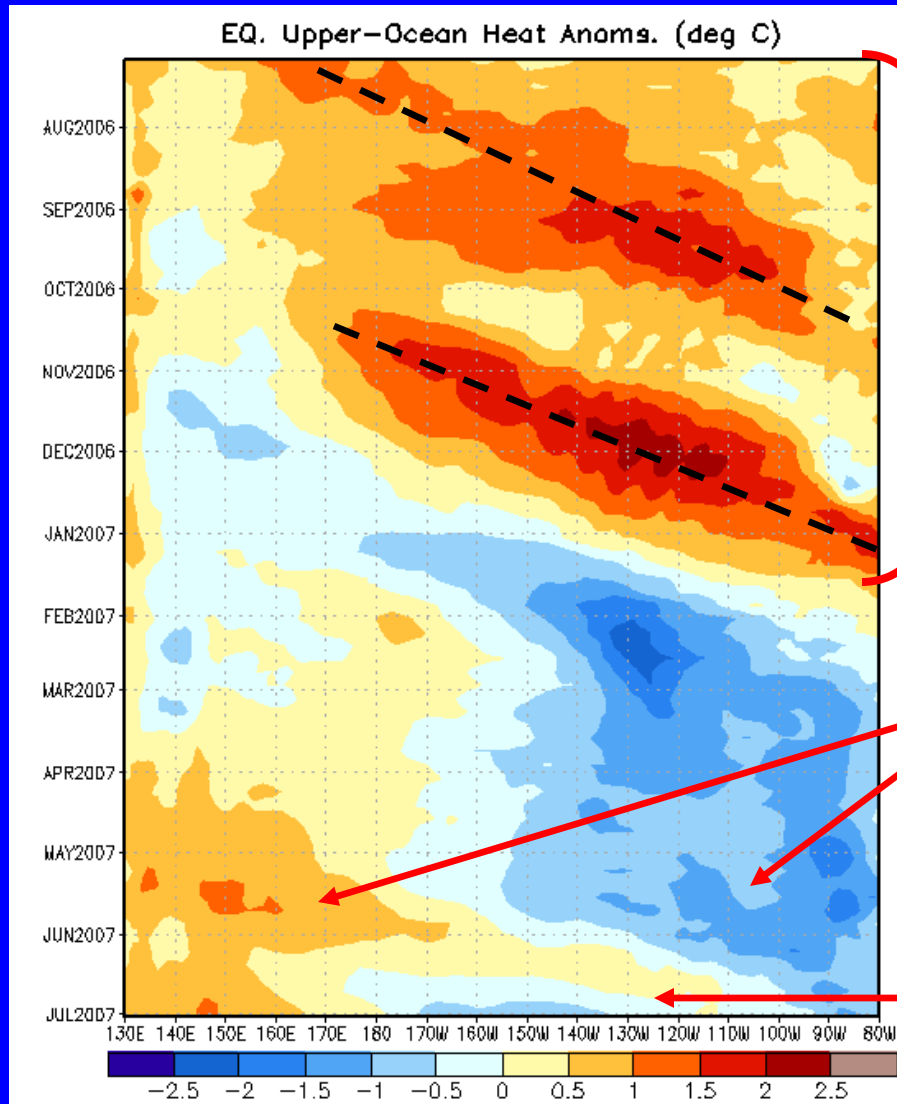
Note that shading denotes the magnitude of the anomalous wind vectors

Westerly anomalies are evident across the equatorial Indian Ocean and maritime continent -- a feature common during a MJO with the enhanced phase leaving the western hemisphere and entering the Indian Ocean.



Weekly Heat Content Evolution in the Equatorial Pacific

Time



During this period two eastward-propagating Kelvin waves (warm phases indicated by dashed lines) have caused considerable month-to-month variability in the upper-ocean heat content.

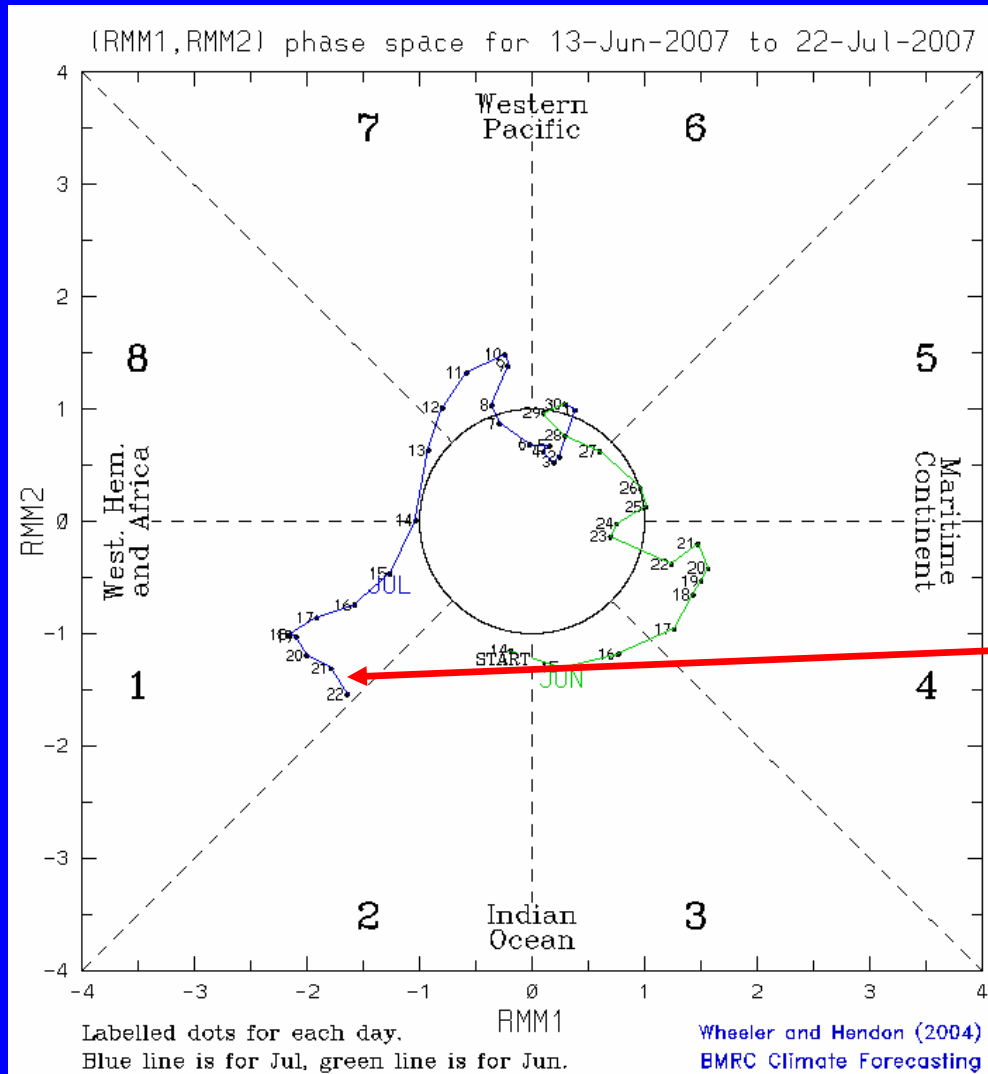
Since January, negative heat content anomalies are evident across the eastern equatorial Pacific and since late March larger positive anomalies are evident in the far western Pacific Ocean.

Most recently negative heat content anomalies have developed east of the Date Line.

Longitude



MJO Index



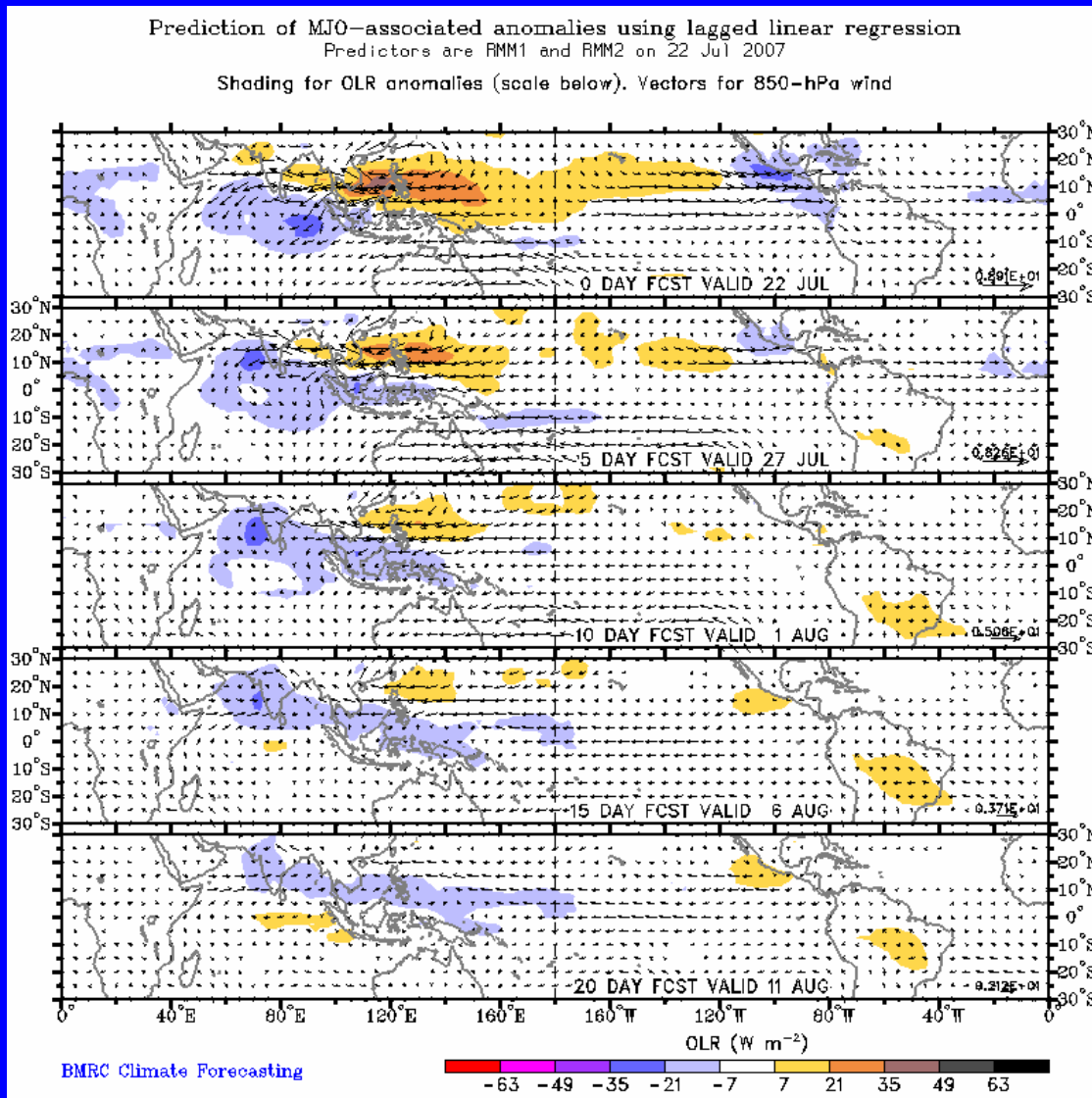
The current state of the MJO as determined by an index based on Empirical Orthogonal Function (EOF) analysis using combined fields of near-equatorially-averaged 850-hPa and 200-hPa zonal wind and outgoing longwave radiation (OLR) (Wheeler and Hendon, 2004).

The axes represent the time series of the two leading modes of variability and are used to measure the amplitude while the triangular areas indicate the phase or location of the enhanced phase of the MJO. The farther away from the center of the circle the stronger the MJO. Different color lines indicate different months.

The MJO index indicates stronger MJO activity during past several days.



MJO OLR Forecast



The statistical method forecasts wet conditions across the Indian Ocean, Bay of Bengal, and parts of Southeast Asia during the next 10 days.

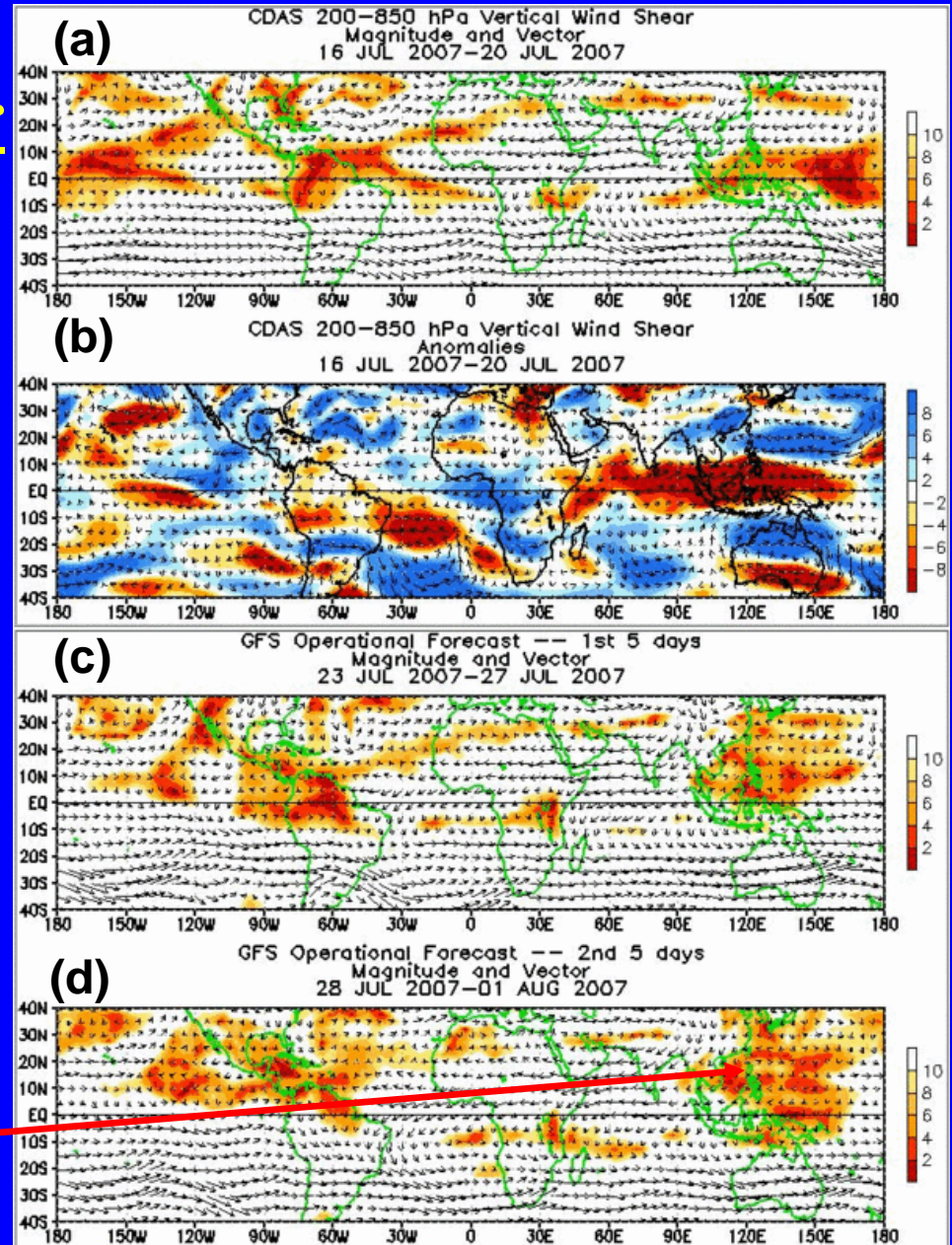


200–850 hPa Vertical Wind Shear

All plots: Shading denotes magnitude of vectors

Plots (a),(c),(d): low shear (red), high shear (yellow/white)

Plot (b): Shear greater than average (blue) Shear less than average (yellow/red)



The GFS forecast indicates decreasing shear across the west Pacific Ocean during the next 10 days.



*****NOTICE OF CHANGE*****

The slides depicting potential benefits and hazards normally located here will no longer be placed within the MJO weekly update. Expected impacts during the upcoming 1-2 week time period can now be found as part of a new product:

Experimental Global Tropics Benefits/Hazards Assessment

The product can be found at:

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ghazards/ghaz.shtml>

Please send questions/comments/suggestions to

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